

CLAIMS:

1. A profiling device comprising:

a color measurement unit for producing digital color measurement values corresponding to measurement light impinging thereon,

a processor for control of the color measurement unit and for processing of the digital color measurement values produced thereby, and

a bi- directional interface controlled by the processor for exchange of data and control commands with an external device connected to the profiling device,

wherein the processor, the color measurement unit and the bi-directional interface are combined into an independent unit, and

wherein the processor incorporates a profile generation program to be started by a starting command supplied from the external device through the bi-directional interface, said profile generation program being adapted to calculate a device profile on the basis of the digital color measurement values produced by the color measurement unit and to make the digital color management values available through the bi-directional interface for acceptance by the external device.

2. A profiling device according to claim 1, wherein the external device is an electronic projector.

3. A profiling device according to claim 1, wherein the profile generation program is further adapted to produce setup color values of individual color samples of a color sample set and to make the setup color values available through the bi-directional interface to the external device, for image-wise reproduction of the corresponding color samples by the external device, and

wherein the color measurement unit is constructed for measurement of image-wise reproduction of the color samples produced by the external device and for forming of corresponding color management values, and

wherein the profile generation program is designed for calculation of the device profile from the provided setup color values and the corresponding color measurement values.

4. A profiling device according to claim 1, wherein the processor includes a calibration program to be triggered by a start command supplied by the external device through the bi-directional interface, and

wherein the processor calculates calibration data on the basis of color measurement values produced by the color measurement unit, and

wherein the calibration data is made available by the processor through the bi-directional interface for acceptance by the external device.

5. A profiling device according to claim 4, wherein the calibration program is designed for producing setup calibration color values from calibration color samples and making the setup calibration color values available to the connected external device through the bi-directional interface, and

wherein the external device utilizes the setup calibration color values to reproduce an image of the corresponding calibration color samples, and

wherein the color measurement unit is constructed for measurement of image reproduction of the calibration color samples produced by the external device and for formation of corresponding color measurement values, the calibration program being

adapted for calculation of the calibration data from the provided setup calibration color values and the corresponding measurement values.

6. A profiling device according to claim 5, wherein the calibration program is adapted to calculate calibration data values for brightness (B), contrast (C) and color temperature (T) and to make the calibration data values available through the bi-directional interface.

7. A profiling device according to claim 1, wherein the processor includes a gamut calculation program which, upon receipt of a command through the bi-directional interface, calculates gamut data from the color measurement values and makes the gamut data available at the bi-directional interface, and

wherein the gamut data describes the color space covered by the color measurement values or reproducible by the external device.

8. A profiling device according to claim 1, wherein the processor includes a trigger program for analyzing the color measurement values produced by the color measurement unit, the trigger program being adapted to react to an occurrence of one or more pre-selected color measurement trigger sequences, and

wherein the trigger program is adapted to start at least one of a calibration program and the profile generation program, depending on the pre-selected color measurement trigger sequence.

9. A profiling device according to claim 1, wherein the processor is designed for providing, upon the receipt of a command through the bi-directional interface, the color measurement values at the interface which are produced by the color measurement unit.

10. A profiling device according to claim 1, wherein the processor is constructed for receiving first control data through the bi-directional interface from the external device and for providing second control data for control of the external device through the bi-directional interface.

11. A profiling device according to claim 1, further comprising an actuating element cooperating with the processor for manual initiation of at least one of the profile generation program and a calibration program.

12. A profiling device according to claim 1, wherein the color measurement unit is equipped with a locally resolving color detector array and input optics for capture of a plurality of spatially separated image regions.

13. A profiling device according to claim 1, further comprising a software function for recognition of a marginal condition based on the color measurement values and for generation of a message to a user concerning the marginal condition.

14. A profiling device according to claim 13, wherein the marginal condition is selected from the group consisting of ambient light, tint of a projection surface, ratio of inherent light to foreign light, stability of projection light, and combinations thereof.

15. A profiling device according to claim 1, further comprising a software function for enabling a change of rendering intents and recalculation of the device profile without re-measurement of the color measurement values.

16. An electronic projector comprising:

at least one input stage for electronic image data,

a transformation stage for transforming the electronic image data received through the input stage into the color space of the projector,

an optical modulator for converting the transformed image data produced by the color space converter into optical image information,

optics for projection of the optical image information produced by the modulator onto a projection surface,

a processor-based control for the transformation stage and the modulator,

a bi-directional interface and a profiling device that form an independent unit in communication with the processor-based control of the electronic projector through the bi-directional interface,

wherein the profiling device includes a color measurement unit for producing digital color measurement values corresponding to measurement light impinging thereon, a processor for the control of the color measurement unit and for processing of the color measurement values produced thereby, and a bi-directional interface controlled by the processor for exchange of data and control commands with the processor-based control of the electronic projector, and

wherein the processor of the profiling device incorporates a profile generation program to be started by a start command provided by the processor-based control of the electronic projector and the processor calculates a device profile on the basis of the color measurement values produced by the color measurement unit, the device profile being provided by the processor to the profiling device for adjustment of the transformation stage and control of the adjustment of the transformation stage on the basis of the device profile.

17. An electronic projector according to claim 16, wherein the profile generation program is designed for producing setup color values of individual color samples of a color sample set and for transferring the setup color values to the processor-based

control of the electronic projector, whereby the processor-based control causes the electronic projector to image wise reproduce corresponding color samples, and wherein the color measurement unit is constructed for measuring the image wise reproductions of the color samples produced by the electronic projector for forming corresponding color measurement values, and wherein the profile generation program is designed for calculating the device profile from the provided setup color values and the corresponding color measurement values.

18. An electronic projector according to claim 16, wherein the processor of the profiling device includes a calibration program to be started by a starting command produced by the processor-based control of the electronic projector for calculating calibration data on the basis of the color measurement values produced by the color measurement unit, the calibration data being provided by the processor to the control and the control calibrating the electronic projector on the basis of the calibration data.

19. An electronic projector according to claim 18, wherein the calibration program is designed for producing setup calibration color values from calibration color samples and for transferring the setup calibration color values to the processor-based control of the electronic projector, whereby the processor-based control causes the electronic projector to reproduce corresponding calibration color samples as an image and wherein the color measurement unit is constructed to measure the image wise representation of the calibration color samples by the electronic projector to form corresponding color measurement values, and wherein the calibration program is designed to calculate the calibration data from the setup calibration color values and the color measurement values.

20. An electronic projector according to claim 19, wherein the calibration program calculates calibration data values for brightness (B), contrast (C), and color temperature (T) and makes the calibration data values available to the processor-based control of the electronic projector.

21. An electronic projector according to claim 16, wherein the processor includes a gamut calculation program which on demand through the interface calculates gamut data from the measured color measurement values and makes the gamut data available at the interface, which gamut data describe the color space which is covered by the measured color measurement values or is reproducible by the projector.

22. An electronic projector according to claim 16, wherein the processor of the profiling device includes a trigger program which analyses the color measurement values produced by the color measurement unit and reacts to the occurrence of one or more pre-selected color measurement value trigger sequences and then starts at least one of a calibration program and the profile generation program dependent on the recognized color measurement value trigger sequence.

23. An electronic projector according to claim 16, wherein the processor of the profiling device is constructed to make available at the interface, upon demand through the interface, color measurement values produced by the color measurement unit.

24. An electronic projector according to claim 16, further comprising an actuating element cooperating with the control for manually triggering the starting command for at least one of the profiling and the calibration program.

25. An electronic projector according to claim 16, further comprising an external communication interface cooperating with the processor-based control of the electronic projector, the control connecting the profiling device with the communication interface

such that a processor-based external device connected to the communication interface can communicate with the profiling device for data and command exchange.

26. A process for profiling of an electronic display device supplied with an image data stream for image wise representation of image information represented by the image data stream, comprising the steps of:

feeding a profiling data stream to the display device which represents an identification pattern and subsequently feeding a series of color samples of a color table that image wise represent the identification pattern and the series of color samples with the display device,

colorimetrically measuring the samples image wise reproduced by the display device and determining color measurement values corresponding to each sample,

detecting the occurrence of the identification pattern by analysis of the measured color measurement values and analyzing such color measurement values for process control in such a way that, after the occurrence of the identification pattern, a device profile of the display device is calculated from the color measurement values of the subsequently following color samples of the color table and the preset color values forming the basis of these color samples, and

adjusting the display device with the device profile.

27. A process according to claim 26, wherein the image data stream is located on a data carrier and the profiling data stream is placed on a separate data carrier of the same type.

28. A process according to claim 26, wherein the image data stream is on a data carrier and the profiling data stream is a leader found on the same data carrier as the image data stream.
29. A process according to claim 26, wherein the profiling data stream is present as an electronic file and is inserted into the image data stream as a leader.
30. A process according to claim 26, wherein the electronic display device is an electronic projector.